

In conclusion I would remark the fact that the gradual approaches in character to the Bovidæ by the recent and extinct genera and families, furnishes one of the most admirable illustrations of the law of progressive specialization by evolution known to me.

NOTE.—Professor Gill has presented in his system of the Mammalia some reasons why the Suidæ should be more exactly defined than I have given above. In the Suinæ and Phaochærinæ the postglenoid process is wanting or rudimental, and the mandibular condyle is flat and triangular. In the Dicotylinae and Hippopotaminae the postglenoid process is well developed and the condyle is subcylindric, as is also the case in Elotherium. I therefore place the two subfamilies named in a family separate from the Suidæ, under the name Hippopotamidæ, to which it is possible that Elotherium should be united as a third subfamily.

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*Biographical Notice of Isaac Lea, LL.D. By Joseph Leidy, M.D., LL.D.*

*(Read before the American Philosophical Society, November 18, 1887.)*

In accordance with the custom of this Society, which requires that a record shall be made of the claims of its deceased members to remembrance, at the request of our President, I have prepared a brief sketch of one who was distinguished among us, our late much respected fellow-citizen and friend, Isaac Lea, LL.D. A more detailed memoir than the one I offer seemed supererogatory from the fact that only a short time previous to his death, there was published in the Bulletins of the United States National Museum, a volume containing a Biographical Sketch of Mr. Lea, comprising fifty-nine pages; and a Bibliography of his publications with a synopsis of the material therein contained, comprising 278 pages, prepared at the request of the Smithsonian Institution, by Mr. N. P. Scudder. To this source I have conveniently applied for much of the information of my notice.

Isaac Lea was born March 4th, 1792, in Wilmington, Delaware. His grandparents, John and Hannah Lea, came from Gloucestershire, England, and accompanied William Penn in his second visit to this country. They were members of the Society of Friends, among whom they were noted as ministers. The father, James Lea, was a merchant, and at the age of fifteen Isaac went to Philadelphia to engage in a similar pursuit. In 1814, the country being at war with England, Isaac joined a volunteer rifle company, which offered its services to the Governor of the State in case of need. As the services were not required, the company was soon disbanded; but in consequence of Isaac joining it, he lost his birthright in the Society of Friends.

At an early age Isaac showed a love for natural history, in which he was encouraged by his mother, who was herself fond of botany, and in-

terested her children in its study. At an early period also he became acquainted with Lardner Vanuxem, who had similar tastes, and together the young men studied mineralogy and geology, in the pursuit of which they made frequent excursions.

In 1815 Mr. Lea was elected a member of the Academy of Natural Sciences of Philadelphia, which had been founded only three years previously. He subsequently from time to time took an active part in the affairs of the institution; and from his ample pecuniary means he liberally contributed towards its objects in the promotion of natural history. From 1853 to 1858 he occupied the position of President of the Academy. In 1817 he published in the *Journal of the Academy* the first of his numerous communications on natural history, entitled "An account of the minerals at present known to exist in the vicinity of Philadelphia."

In 1821 Mr. Lea was married to Miss Frances A. Carey, an accomplished lady, the daughter of Mathew Carey, a well-known publisher and a writer on political economy. He also became a member of the firm of M. Carey & Sons, which at that time was the most extensive publishing house in the United States; and he continued with this and the successive firms until he retired from the business in 1851. Mr. Seudder remarks that few men have been more happy in their married life, which reached through fifty-two years, when the death of Mrs. Lea occurred, leaving her greatly afflicted husband together with two sons and a daughter.

In 1828 Mr. Lea was elected a member of the American Philosophical Society, in which for many years he took an active part; for some time serving as one of its Vice-Presidents and as Chairman of the Publication and Finance Committee.

In the spring of 1832, together with his family, he went to Europe and visited England, France and Switzerland; returning the following autumn. In June, 1852, in company with his wife, daughter and sister, he again went to Europe, visited England, France, Germany, Austria and Italy, and returned in November, 1853. In these trips, while taking advantage of the opportunity to examine and study the favorite subjects of his special research in the great museums, he was everywhere received with the most friendly attention by eminent naturalists and others.

In 1852 Harvard University honored Mr. Lea with the title of LL.D. In 1860 he presided at the meeting of the American Association for the Advancement of Science, held at Buffalo, N. Y. As an evidence of his continued interest in all that concerns the cause of natural science, when upwards of ninety-two years of age, at the meeting of the Association and its guests of the British Association in Philadelphia, in September, 1884, he invited the members to visit him at his summer residence at Long Branch, N. J., where he had the pleasure of receiving and entertaining about two hundred.

Mr. Lea, as usual with men of distinction who have made themselves known by their scientific labors, was enrolled as an associate in numerous learned societies abroad and at home.

He reached the advanced age, within a few months, of ninety-five years, retaining to the last his intellect and his interest in his family. in science and everything that had rendered him happy during life. He died December 8th, 1886.

Mr. Lea was an enthusiastic student and an ardent lover of nature, and though like most other people occupied for many of the best years of his life with the exacting cares of business, he always found leisure successfully to pursue his studies and investigations in natural history. He was especially interested in mineralogy, geology and palæontology, but above all delighted in and devoted most time to the study of the fresh-water Mollusca, for which a favorable opportunity was afforded in the fact that the great rivers of this country are particularly rich in these animals and had been but imperfectly explored at the time of his taking up the study.

To all the subjects indicated and to others Mr. Lea has contributed to our knowledge; but to the last one in an eminent degree not excelled by other naturalists. The record of this knowledge is contained in numerous communications, for the most part published in the Transactions of the American Philosophical Society and the Journal of the Academy of Natural Sciences of Philadelphia. Mr. Lea was a most acute and accurate observer and a most painstaking and conscientious investigator. Of the fresh-water and terrestrial Mollusca, Mr. Lea has described upwards of sixteen hundred new species of about fifty genera. The descriptions are given in the most comprehensive manner with exhaustive detail, and are accompanied with admirable illustrations. He was enabled to make this large contribution to our knowledge from the fact that his name became everywhere known as the leading authority in this department of conchology, and collectors in every land eagerly submitted to him all specimens supposed to be new or otherwise of scientific interest which came into their hands.

Of Mr. Lea's labors relating to the extensive family of fresh-water Mollusca, the Unionidæ, Prof. Owen, of England, has expressed himself in the following words: "You have set a noble example of persevering devotion to the elucidation and making known to your fellow-men, of the portion of God's creation selected by your judgment, taste and opportunities for your studies. You will leave a grand and enduring monument of what one man may accomplish under such conditions, and I trust you may enjoy many years cheered by the retrospect of past labors, and by the grateful estimation in which they are held by the naturalists and lovers of science in both hemispheres."

Mr. Lea's chief contributions to geology and palæontology are found in the following works:

Contributions to Geology. 8vo. Philadelphia, 1833; 227 pages and 228 figures. This is one of the earliest and most extensive contributions to a knowledge of the geology and fossils of the Tertiary formations of this country. The work relates to the formations of Alabama, Maryland

and New Jersey, and contains descriptions of two hundred and twenty-eight new species of fossil Mollusca, together with a few other fossils.

Notice of the Oolitic Formation in America, with descriptions of some of its Organic Remains. Published in the Transactions of this Society in 1841. It relates to the formation in New Grenada and Cuba, and contains descriptions and figures of upwards of twenty new species of Ammonites, Trigonia, Terebratula, etc.

On Fossil Footmarks in the Red Sandstone of Pottsville, Pa., published in the Transactions of this Society in 1852. An earlier notice is given in the Proceedings of 1849. In this is described the tracks of an amphibian vertebrate to which Mr. Lea gave the name of *Sauropus primævus*. The fossil was discovered by Mr. Lea in the Red Sandstone of Formation No. 11, below the Coal Measures, of Roger's plan, of the Geological Survey of Pennsylvania. The report of the discovery at the time excited considerable interest among naturalists from the circumstance that the specimen was the earliest evidence of the existence of air-breathing vertebrates.

Description of a Fossil Saurian of the New Red Sandstone Formation of Pennsylvania. Published with illustrations in the Journal of the Academy in 1852. This gives a description of a saurian reptile to which Mr. Lea gave the name of *Olepyssaurus pennsylvanicus*, based on some fossil bones discovered at Milford, Lehigh county, Pa., the first at that time found in the Triassic formation of this country.

Mr. Lea took the advantage of his opportunities to make a full collection of the objects of his study and investigation, and this, with the exception of the collection of Tertiary fossils, which was presented to the Academy of Natural Sciences during his life-time, he has bequeathed to the National Museum at Washington, where it will be preserved for the study and admiration of future naturalists.

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*Stated Meeting, September 2, 1887.*

Present, 9 members.

President, Mr. FRALEY, in the Chair.

Correspondence was submitted as follows:

Letters of envoy from the Madras Observatory; Physikalisch-Central-Observatorium, St. Petersburg; K. P. Akademie der Wissenschaften, and Physikalische Gesellschaft, Berlin; Académie Royale des Sciences, Lettres et Arts, Modène; Musée Guimet, Paris; Meteorological Office and Statistical Society, London; Harvard College, Cambridge, Mass.; United